

Management of food allergies in schools: A perspective for allergists

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Activity Objectives

1. To become familiar with the current literature regarding food allergy and anaphylaxis in schools.
2. To understand and be able to address current deficiencies in preventing food-induced allergic reactions in schools.
3. To understand the risk factors for food-induced allergic reactions and anaphylaxis in the school setting.
4. To understand and be able to create an evidence-based, effective emergency action plan for students with food allergies.
5. To understand the role allergists play in caring for school-aged children with food allergy.

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Epidemiologic studies indicate that food allergy has increased among school-aged children and now affects approximately 1 in 25. Food allergy and other triggers of anaphylaxis pose considerable challenges in the school setting. The cornerstones of management include methods to prevent relevant exposure to allergens and plans to recognize and treat allergic reactions and anaphylaxis. Numerous studies have identified gaps in the implementation of procedures to address these simple tenets. Guidelines and policies have been proposed from various stakeholders to improve the safety and management of schoolchildren with food allergy and anaphylaxis. However, there

remain knowledge gaps that preclude suggesting definitive evidence-based guidelines to approach all aspects of management. The allergist plays a key role in guiding families, schools, administrators, and policymakers in developing meaningful plans to improve the safety of the school setting for children with food allergies and anaphylaxis. We review literature that is relevant to key elements that can assist the allergist in addressing patient- and school-specific issues. We additionally focus on areas of current controversy, provide information about available resources, and highlight areas in need of further study. (*J Allergy Clin Immunol* 2009;124:175-82.)

Key words: Food allergy, school, anaphylaxis

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Evidence is mounting that food allergy and anaphylaxis have been increasing in school-aged children. A recent Centers for Disease Control and Prevention study reported that approximately 3 million school-aged children (3.9%) in the United States had food allergies in 2007, representing an 18% increase since 1997.¹ Additional reports support dramatic general increases in anaphylaxis^{2,3} and doubling in the rate of childhood peanut allergy^{4,5} in recent decades. Food allergy is a common trigger of anaphylaxis for school-aged children.⁶⁻⁹ Survey studies indicate

Abbreviations used

AAAAI: American Academy of Allergy, Asthma & Immunology
 EAP: Emergency action plan
 FAAN: Food Allergy and Anaphylaxis Network
 IHP: Individualized health care plan

16% to 18% of children with food allergy experienced a reaction in school.^{10,11} Notably, reactions also occur in children before diagnosis. Nearly 25% of peanut/nut-induced allergic reactions in school/day care were reported to be before diagnosis,¹¹ and in a survey of school epinephrine administration, approximately 25% of recipients had no previous diagnosis.¹²

Recognizing this evidence and the understanding that fatal anaphylaxis is a risk, many schools have implemented proactive management plans to prevent and treat food allergen-induced anaphylaxis. Here we review literature that is pertinent to the management of food allergies and anaphylaxis in schools. We highlight gaps in management that have been delineated in various studies and present key issues for effective management plans. Moreover, we review topics of controversy regarding avoidance and treatment plans. Our goal is to provide the allergist with data that are relevant for individualized decision making and for guiding families, schools, administrators, and policymakers in developing meaningful plans to keep students who have food allergy safe without unnecessarily isolating or excluding them from school activities.

IDENTIFICATION OF DEFICIENCIES IN PREVENTING AND TREATING FOOD-INDUCED ALLERGIC REACTIONS IN SCHOOLS

A landmark study on fatal and near-fatal food-induced anaphylaxis in children and adolescents by Sampson et al¹³ in 1992 reported that 4 of the 6 fatalities but none of 7 near-fatal reactions occurred in school. Notably, the fatalities were associated with significant delays in treatment with epinephrine, with no child receiving epinephrine sooner than 22 minutes after symptoms and a mean treatment time of 75 minutes. This striking observation prompted investigators to study food allergy management plans and policies in schools. The American Academy of Allergy, Asthma & Immunology (AAAAI) subsequently published a position statement entitled "Anaphylaxis in schools and other childcare settings" in 1998 that presented advice to ameliorate the risks.¹⁴ Numerous studies examining food allergy and anaphylaxis care in schools and childcare settings have primarily identified 2 main deficiencies.

Inadequate food allergy management plans

Management plans include written emergency action plans (EAPs), which delineate medical treatment for allergic reactions, as well as general or individualized plans for prevention. Several studies report deficiencies in establishing and implementing these plans. For 100 randomly selected children registered in the US Peanut and Tree Nut Allergy Registry, Sicherer et al¹¹ found that an EAP was in place in only 33% of the cases, and during a reaction, it was followed only 73% of the time. Rhim and McMorris¹⁵ surveyed 109 schools in Michigan and found EAPs were in place for only 16% of the students, and only 21% of school policies addressed the issues of reading labels and hidden ingredients.

Nowak-Wegrzyn et al¹⁰ interviewed parents and school representatives of 132 schoolchildren with food allergy. Of those students who had food-induced allergic reactions in school, 14% had no physician's order for treatment. Wu and Hill¹⁶ surveyed school nurses from 47 schools in Indianapolis and found that 53% of the schools had no policy for management of anaphylaxis and the remaining 47% had a policy that consisted only of calling 911. Weiss et al¹⁷ performed a national survey of 400 school nurses and found staff training was in place for 78%, 43% used guidelines provided by the state, and 32% followed guidelines developed by an outside organization. Watura¹⁸ surveyed 83 schools in the United Kingdom and found 9% of schools were unable to state what they would do in the event of an allergic reaction; representatives of 1 school stated they would ask the child. Pouessel et al¹⁹ found that for 107 French schoolchildren with food allergy, only 54% had health care plans, and 72% had epinephrine autoinjectors. Gold and Sainsbury²⁰ found only 40% of 68 Australian schoolchildren with a history of anaphylaxis had epinephrine and an anaphylaxis action plan in place in their school. Moneret-Vautrin et al²¹ reported that for 45 schoolchildren with food allergy in France who were prescribed individualized health care plans (IHPs) for school, only 39 were implemented. Implementation was key because allergic reactions occurred in 33% of the children with plans in place and in 83% of the 6 children with no plan in place. These findings highlight the importance of implementing and reviewing school management plans and support the need for more widely promulgated guidelines regionally or nationally.

Deficiencies in recognizing reactions and treating reactions with epinephrine

Another deficiency in school food allergy management regards inadequacies in recognizing and treating anaphylaxis. For children in the US Peanut and Tree Nut Registry, Sicherer et al¹¹ found that in 32% of the cases, school personnel did not recognize the symptoms of an allergic reaction. Nowak-Wegrzyn et al¹⁰ showed that although all but 1 school had personnel trained to administer epinephrine, 22% had no backup staff, and 16% had no medications available. Watura¹⁸ found 64% of the students with nut allergy had no available medications of any kind, and only 26% had epinephrine. As indicated previously, significant delays in treatment with epinephrine are associated with fatalities in the school setting.^{7,13} Allergists can play a key role in ensuring that students at risk for potentially life-threatening anaphylaxis have epinephrine in school. Additionally, programs should be in place to train staff on the recognition and treatment of anaphylaxis.

EVIDENCE BASE AVAILABLE FOR CONTROVERSIAL ISSUES IN AVOIDANCE AND TREATMENT

The principles of successful food allergy management are avoidance and being prepared with appropriate treatment of acute allergic reactions. The tenets of avoidance and treatment, as they apply to families, schools, and students, are summarized in a brief document entitled "School guidelines for managing students with food allergies" (<http://www.foodallergy.org/school/schoolguidelines.pdf>; see Appendix I in this article's Online Repository at www.jacionline.org) endorsed by the National School Board Association, the Food Allergy and Anaphylaxis Network, the National Association of School Nurses, and the National Association

of School Principals. These points should be reviewed and addressed with schools, patients, and families, but here we focus on the controversial issues that arise in various management plans.

Are casual skin contacts and inhalation exposures life-threatening, can peanut residue be effectively cleaned, and should peanuts be banned?

A concern that often drives avoidance measures is the belief that life-threatening anaphylaxis can result from skin contact or from “airborne exposure.” There are case reports in the literature, all self-reports or retrospective questionnaires, of significant allergic reactions to peanut/nuts from skin contact and inhalation.^{11,12,22-24} Bronchial challenge studies,²⁵ reports of reactions in persons near foods being cooked (eg, fish, egg, pea, and milk),²⁶ and occupational asthma induced by wheat and shellfish,^{27,28} for example, confirm that foods can be airborne and induce reactions during heating and preparation, observations that support avoidance of allergy-causing foods for craft and cooking projects. However, in 1 school study casual exposure to peanut butter resulting in reactions was reported primarily from craft projects using peanut butter, and these were primarily mild reactions.¹¹ Peanuts and peanut butter at room temperature, although having a distinctive aroma, have no significant vapor phase containing peanut protein.²⁹ It is important to educate families and schools that allergic reactions to food are immunologic responses to food protein allergens³⁰ and not to the odors of food, which are neurologic responses triggered by volatile organic compounds.³¹ These volatile organic compounds, such as pyrazines in the case of peanut, are not proteins and do not trigger allergic reactions.³²

This point was addressed by Simonte et al,²⁶ who performed double-blind, placebo-controlled inhalation challenges with peanut butter on 30 school-aged children with significant peanut allergy, exposing them to either peanut butter or placebo for 10 minutes and finding no subjective or objective reactions. In the same study they exposed the children to skin contact with peanut butter for 1 minute by using a double-blind, placebo-controlled challenge and found only mild contact symptoms with no systemic symptoms. Based on the number studied, the authors concluded with 95% confidence that for 90% of children with peanut allergy exposed to peanut butter by means of inhalation or skin contact, the risk of anaphylaxis was remote. The authors cautioned that their findings should not alter school plans in place that would take into account the possibility of skin-to-mouth exposures that could result in systemic reactions. Wainstein et al³³ further investigated the issue of skin contact with peanut butter by using a modified patch test, applying 1 g of peanut butter with an occlusive patch to normal skin for 15 minutes, with observation of the child after removal of the patch. The majority (59%) of the patch test results were negative, and no systemic reactions were observed. Thus no systemic reactions to peanut butter occurred after a longer and more concentrated skin exposure than seen in the study by Simonte et al.²⁶ These studies are reassuring, demonstrating that the major risk of anaphylaxis arises from peanut butter ingestion and not through skin contact or inhalation.

A related concern regards cleaning of hands and table surfaces, issues addressed in most school food allergy management plans. Perry et al²⁹ examined the effectiveness of routine cleaning methods and agents using an assay for Ara h 1, a major peanut protein. Adult volunteers without peanut allergy applied peanut

butter to their hands and then cleaned their hands with a variety of cleaning agents, including bar soap, liquid soap, and commercial wipes. All cleaning agents were effective in removal of Ara h 1 from their hands, with the exception of alcohol-based hand sanitizer. Similarly, table surfaces contaminated with peanut butter were effectively cleaned by soaps and commercial cleaning agents but not dishwashing liquid alone. The authors conclude that peanut protein is relatively easy to clean with conventional cleaning methods.

Although these studies are reassuring regarding casual exposure to peanut butter and relative ease of cleaning, there remains a concern that any exposure to the allergen could lead to ingestion and anaphylaxis, hence raising the issue of banning foods in some fashion. One study showed that “peanut-free guidelines” can result in a significant reduction in children’s lunches containing peanut.³⁴ However, there are no studies that directly examine the incidence of allergic reactions to peanut in schools that ban peanuts compared with schools that do not. Without an evidence base, the question of “to ban or not to ban” peanuts remains unresolved (Table I).³⁵ Schools can develop policies based on age-related risks of exposure by using an assumption that the younger the age, the more likely the children are to touch each other and contaminate each other’s food and increase the risk of allergen exposure or to share foods. A large group of young children is also more difficult to monitor and control. For these reasons, the practice of banning peanuts from preschool age to lower elementary school age is not uncommon. Aside from school-wide bans, “allergen-safe” tables and classrooms are options. “Peanut-safe” tables are often used in elementary school cafeterias to allow for closer monitoring and more intensive cleaning efforts. The major drawback is the possible sense of social isolation for the children, something that can be avoided by allowing friends with safe lunches to be seated at the table as well. Because older children have better impulse control and can comprehend the rationale for allergen avoidance, peanut-safe tables and bans should generally be unnecessary for upper elementary school age and up. It should be appreciated that most schools have not attempted to ban milk, even though per capita this food was shown to result in more reactions.¹⁰ Designated tables with increased supervision for younger children remains another option.

Encouraging hand washing before and after meals is a component of most food allergy guidelines. Outcome studies on hand washing have not been performed, and therefore cost and time considerations might also be relevant in formulating school plans. These recommendations should also be individualized for the student based on his or her clinical history, age, and developmental abilities.

Although a focus is often on cafeterias, reactions in schools often occur outside of the cafeteria. In the children registered in the US Peanut and Tree Nut Registry, 79% of reactions occurred in the classroom, usually with skin contact during craft projects, such as peanut butter-containing bird feeders, and only 12% of reactions occurred in the cafeteria.¹¹ Similarly, 46% of anaphylactic reactions in Massachusetts schools occurred in the classroom compared with 9% in the cafeteria.¹² Thus it is important to advise food allergen avoidance in the classroom (eg, crafts and parties), as well as in the school cafeteria.

Studies relevant to the EAP for food allergy

In a previous “Clinical perspectives” article, Sicherer and Simons³⁶ addressed the issue of identifying a child “at risk” of

TABLE I. Peanuts in schools: To ban or not to ban

Pro	Con
"Loaded gun" argument: reducing chance of exposure to potentially lethal allergen	"No peanut detectors" to enforce ban: very difficult to guarantee "peanut-free school"
Young children cannot bear responsibility; school staff might be inadequate	Might cause undue burden on children without peanut allergy
Food contamination of shared sports equipment and other sources of skin contact	"Slippery slope argument": ban other foods for other allergies, ban all foods?
Food sharing a common behavior in children	"False sense of security" argument
School bullying difficult to control	Schools should be preparing students for the "real world"
A community approach to safety	Feelings of divisiveness

anaphylaxis who would warrant prescription of epinephrine, as well as quandaries in deciding when epinephrine should be injected (eg, for what symptoms). Here we address some aspects of these and other controversial issues of school anaphylaxis management.

How close by should the child's epinephrine be kept? The prompt administration of epinephrine as the primary treatment for anaphylaxis has been reviewed extensively³⁷⁻⁴¹ and also recommended in the "Updated practice parameter for the diagnosis and management of anaphylaxis."⁴² Multiple case series of fatal and near-fatal anaphylaxis show that fatalities occur when epinephrine is unavailable, not given, or given too late.^{7,13,43-45} In Pumphrey's case series,⁴⁶ only 8 of 37 patients with food anaphylaxis-induced fatalities received epinephrine. The median time from food ingestion to cardiorespiratory arrest was 30 minutes (range, 3-360 minutes). In a review of 123 cases of pediatric anaphylaxis presenting to an emergency department, the median time from exposure to anaphylaxis was 10 minutes, and the median time to administration of epinephrine was 40 minutes.⁹ In the study by Gold and Sainsbury,²⁰ morbidity was significantly lower in children who received epinephrine early, with lower hospitalization rates (15%) compared with those who did not (49%).

Several studies show that epinephrine autoinjectors are stored in a variety of locations (eg, kept in the classroom, administrative office, or nurse's office; carried by the student; and passed from teacher to teacher), but the efficacy of these various approaches has not been studied.^{15,17,21,47} It is clear, however, that access is needed in locations beyond the cafeteria. McIntyre et al¹² collected data on the occurrence of anaphylaxis in schools in the state of Massachusetts, where nurses file a report with each administration of epinephrine to the Massachusetts Department of Public Health. From 2001 to 2003, 115 administrations of epinephrine were reported. The majority of the reactions occurred in the classroom (46%), followed by the health office (17%), playground (10%), and cafeteria (9%). The average time from onset of symptoms to administration of epinephrine was 10 minutes. Almost all states now have laws that permit students to carry and potentially self-administer their epinephrine autoinjectors during school.⁴⁸ There are no evidence-based data indicating at what age a child is able to carry and administer epinephrine. The decision to allow a student to carry epinephrine should be discussed among the family, physician, school staff, and student. If epinephrine is to be kept in another location, such as the nurse's office, the access time should be within minutes. Physicians should advocate for storage in secure but unlocked locations.

When should epinephrine be given in the school setting? The recommendation for administering epinephrine outside of a

medical setting should be written and predicated on the patient's history and risk factors for fatal anaphylaxis. This presents a challenge for the prescribing physician, who might need to incorporate latitude for a health care professional (eg, a school nurse) to decide on treatments based on specific symptoms and history while avoiding plans with complex decision making for persons without health care expertise (eg, a delegate). A history of asthma increases the risk of fatal anaphylaxis,^{7,13,44,45} as does a history of previous anaphylaxis.⁴⁹ For this reason, a history of asthma and previous anaphylaxis would lower the threshold for early epinephrine administration. Several studies show that a mild reaction can subsequently be followed by a severe reaction when the food is ingested at a later time,^{50,51} and therefore a symptom-based approach must be maintained (eg, to inject epinephrine for progression of symptoms or for any significant respiratory or cardiovascular reactions). It is important to educate families and school staff that epinephrine is the treatment for food-induced respiratory symptoms during anaphylaxis and not to solely depend on inhaled bronchodilators or antihistamines. For known ingestion of a food that has previously resulted in anaphylaxis, the AAAAI recommendation for treatment in a nonmedical setting is to administer epinephrine at the first sign of symptoms, and if the known ingestion (or insect sting) was to an allergen that previously induced severe cardiovascular collapse, epinephrine should be injected even before symptom onset.¹⁴ Isolated dermatologic reactions without progression or association with systemic symptoms might be treated initially with antihistamines, but in the absence of a medical professional, it would be prudent to err on the side of treating with epinephrine when symptoms develop after known exposure to an allergen that has previously triggered a significant allergic reaction.^{14,36} It should be emphasized that epinephrine is generally safe and that the pharmacologic side effects that could occur (eg, pallor, tremor, palpitations, headache, anxiety, and nausea) if epinephrine is administered unnecessarily are mild and transient.⁵²

How many doses of epinephrine should be available for use in school? Five publications on anaphylaxis treatment for a variety of triggers report a subset of patients requiring more than 1 dose of epinephrine for anaphylaxis.⁵³⁻⁵⁷ A meta-analysis of these 5 case series (301 total reactions requiring epinephrine and 73 reactions requiring >1 dose) shows that 24% of the time treatment of anaphylaxis of all causes requires more than 1 dose of epinephrine. A meta-analysis of the reports of food-induced anaphylaxis only⁵⁵⁻⁵⁷ shows that for 132 total food-induced reactions treated with epinephrine, 25 (19%) subjects received more than 1 dose of epinephrine.

TABLE II. Quandaries about school management of anaphylaxis and food allergies for the allergist

Concern/quandary	Issues	Possible solutions/approaches
Documentation of a “life-threatening” food allergy might not be straightforward	Children who had not already experienced anaphylaxis might still be “at risk” (eg, peanut allergy) Children might have a provisional diagnosis	Educate about unpredictable nature of anaphylaxis As indicated, confirm diagnosis (eg, oral food challenge) Appreciate increased risk for those with asthma, prior severe reactions
Decision about epinephrine autoinjector doses	Manufacturers suggest switch from 0.15 mg to 0.3 mg at 66 lbs but allow physician discretion to reduce underdosing	Consider 0.3-mg injector at >55 lbs; physician discretion allows for switch at lower or greater weight depending on past history of reactions, anaphylaxis, and asthma
Decisions regarding bronchodilators and antihistamines as part of the EAP	Caregivers in school might delay therapy with epinephrine if treatment with antihistamines or bronchodilators is an option Mild allergic reactions might not warrant epinephrine	Review all aspects of allergy care with caregivers Consider past reaction history Provide EAPs that emphasize injection of epinephrine as the primary treatment for anaphylaxis and present simple approaches to symptom-based treatment (see text)
Decisions about cleaning and hand washing	Practicality, resources, and budget might be prohibitive	Consider age, specific allergies, school setting, and risk factors in presenting directions about extent of cleaning Emphasize that allergen is cleaned easily with common cleaning agents
Decisions about bans, allergen-free tables	See Table I	Consider age, developmental level, and specifics about the allergies Emphasize no-food-sharing policies Review risks from exposures Emphasize supervision
Autoinjectors (location, number, and storage)	Economic and practical issues	Consider “unassigned” injectors for schools, if allowed by state law and district policies Secure unlocked storage located within minutes of student Consider state law, as well as age and travel issues (eg, sports and bus) for carrying/self-administration Emphasize that a responsible adult should be available

The current practice parameters for the treatment of anaphylaxis recommend administering repeat doses of epinephrine every 5 to 20 minutes after the first dose until symptoms are controlled.⁴² Therefore it is imperative that school staff call for emergency medical help as soon as the first dose is given and that they alert the dispatch officer that the student might need additional epinephrine. Ideally, students should have 2 doses of epinephrine available in school. Having 2 doses available for every student presents financial burdens, and consideration might be given for cost-savings approaches, such as having “unassigned second” doses available.⁵⁸ Based on studies showing that about 25% of school anaphylaxis occurs in persons without a prior diagnosis,^{11,12} allergists should advocate for unassigned epinephrine autoinjectors of both strengths for the potential treatment of individuals having their first reactions in school if district policies, state laws, and budgets allow this prescription.

Emergency transport. In the study of fatal and near-fatal food anaphylaxis by Sampson et al,¹³ 3 of the 6 fatalities had biphasic responses presenting with early oropharyngeal and abdominal symptoms, followed by a 1- to 2-hour symptom-free interval and a late phase with respiratory symptoms and hypotension that was poorly responsive to epinephrine. This observation and additional literature⁵⁹ support the notion that the risk for biphasic anaphylaxis warrants that EAPs indicate the need to activate

emergency services with transport of the student to an emergency care facility even if symptoms of anaphylaxis responded to initial therapy. Additional quandaries about treatment in the school setting are shown in Table II.

LEGAL CONSIDERATIONS REGARDING FOOD ALLERGIES IN SCHOOLS

The legal rights of children with potentially life-threatening food allergies are protected under federal civil rights laws.⁶⁰ Children with the diagnosis of anaphylaxis meet the definition of having a “disability.” The Rehabilitation Act of 1973, Section 504, and the Americans with Disabilities Act of 1990 prohibit institutions from discriminating against children on the basis of their disability and guarantees these children a free, appropriate education. Section 504 provides legal recourse for students and their families when they and the school are unable to come to terms on the health care plan through normal channels, although for most situations, 504 plans are typically unnecessary. Federal regulations require schools to provide students with food allergy who participate in the free breakfast or lunch programs with appropriate substitutions at no cost to the family, provided the school has received written documentation of the child’s food allergy and suggested substitutions from a health care provider.

TABLE III. Role of the allergist in school food allergy management

Maintain up-to-date knowledge of the food allergy and anaphylaxis literature
Confirm and document a potentially life-threatening food allergy
Review with the family and student the signs and symptoms of anaphylaxis and when and how to treat, including techniques of administration and indications of self-injectable epinephrine
Work with the family and school staff to provide them with the evidence base to create reasonable and practical IHPs that provide for safety without stigma or isolation of the student in the cafeteria, classroom, and throughout the school day
Provide written, easy-to-follow instructions (EAPs) to the parents for distribution to school staff and others for recognizing and treating a reaction, including the medication to be given and the appropriate dosing
Periodically review the EAP and update it as the child's needs change
Maintain regular follow-up with the child and family, updating the history and status of the child's food allergy, renewing prescriptions for epinephrine, reviewing autoinjector technique, and considering factors that could alter the IHP
Be a resource for the family, school, and community, providing individualized guidance, as well as general education, regarding food allergy and anaphylaxis

The Food Allergy and Anaphylaxis Network (FAAN) has developed a set of recommendations for school management of food allergies and published an EAP form that has subsequently been the universal template for most school plans.⁶¹ Following the model developed by the FAAN, an increasing number of states have published state-wide guidelines for managing food allergies in school (see [Table E1](#) in this article's Online Repository at www.jacionline.org).^{62,63} Proposed legislation for development of national voluntary guidelines for managing food allergy and anaphylaxis in schools is being considered.⁶⁴ Canada has voluntary guidelines recommended by the Canadian School Boards Association that were first published in 1995,⁶⁵ and various provinces have mandatory (Ontario and British Columbia) or voluntary school guidelines (Harada L, anaphylaxis Canada, 2009, personal communication).

QUALITY-OF-LIFE EFFECT OF FOOD ALLERGIES

Multiple studies have documented the significant effect of food allergies on diminishment of quality of life for both children and parents.⁶⁶⁻⁶⁹ Fear and anxiety can lead to requests for unnecessarily restrictive school environments and affect health care planning, resulting in conflicts among the family, physician, and school community. The allergist should play a key role in ameliorating these concerns and successfully mediate a reasonable evidence-based plan that promotes safety and mutual cooperation. For example, the allergist can place risks in perspective by reviewing the types of exposures more and less likely to cause reactions, the risks associated with various activities, and the effectiveness of measures that are in place to avoid and treat reactions. The allergist might also encourage referral for counseling if anxiety levels are problematic.

SCHOOL GUIDELINES: THE IHP

The IHP is a complete management plan for the student that consists of a preventive proactive plan for day-to-day management of food allergy in the school. The student's IHP should be a collaborative effort of the family, physician, and school nurse with input from other school personnel, including teachers, principal, food services director, playground monitors, and school transportation staff. General recommendations for IHPs are included in all published state guidelines (see [Table E1](#)), and elements are reviewed in the School Guidelines Summary (see [Appendix I](#)).

Specific avoidance and preventive strategies will be dependent on the child's age, maturity, attention span, ability to follow commands, and social interaction skills, as well as age-specific issues and problems. As the child grows older, the IHP will need to be modified accordingly.⁶⁰ For example, young children have

frequent tactile interactions, increasing the risk of allergen transfer from the skin to the mouth.⁷⁰ Adolescents have issues related to peer pressure, denial, and risk-taking behaviors that can often undermine their management plans.^{71,72} In a survey of 174 adolescents, only 61% reported always carrying their epinephrine autoinjectors, and 54% purposefully ingested potentially unsafe food.⁷² Adolescents and young adults are the age group at highest risk for fatal food anaphylaxis and require extra counseling and education.^{13,43,45}

There is unfortunately a paucity of data on food-induced allergic reactions occurring in school buses and on playgrounds, and therefore recommendations are made empirically and based on minimizing risk. To prevent food-induced allergic reactions on the bus, the IHP can recommend a no-eating policy on the bus, and the younger children with food allergies can be seated closer to the bus driver for more careful monitoring. In the study by McIntyre et al,¹² 10% of reactions requiring epinephrine occurred on playgrounds. Adults supervising outdoor activities and school trips should be aware of the student's food allergies and be prepared to implement the student's IHP and EAP.

The general education of school staff, students, and the community of food allergy as a life-threatening disorder should follow the model of asthma education, which has an evidence base of grade A quality.⁷³

A crucial element of the IHP is the EAP, also described as a "food allergy action plan" or "anaphylaxis action plan," which provides the school staff with a detailed written plan for the management of acute allergic or anaphylactic reactions for each child. The EAP is based on the child's previous history of clinical reactions, recognition of the symptoms of anaphylaxis, and the appropriate administration of treatment. The EAP developed by the FAAN (see [Appendix II](#) in this article's Online Repository at www.jacionline.org) has been the most widely used plan and can be downloaded from the FAAN Web site.⁷⁴ The EAP from the FAAN can be modified according to the specific needs of the student and the school. For example, there can be specific instructions based on previous history of anaphylaxis, concomitant history of asthma, and specific directions for a delegate if the nurse is unavailable.

Despite its universal acceptance by national organizations and inclusion in published state guidelines, a recent survey of school nurses showed that although 64% of school nurses had food allergy emergency plans available, only 15% used the current FAAN plan.⁷⁵ Another example of an EAP developed through the AAAAI is available (http://www.aaaai.org/members/resources/anaphylaxis_toolkit/action_plan.pdf). The current quality of the evidence for anaphylaxis management plans in the literature

was reviewed by Nurmatov et al⁷⁶ and found to be weaker compared with asthma management plans because of the lack of randomized controlled trials. They conclude that patients' and caregivers' acceptance of such plans might reduce the risk of recurrent anaphylaxis and suggest further and more rigorous study.

CONCLUSIONS

The increasing population of children with food allergy, with the resulting increased potential for anaphylaxis occurring in schools, mandates that policies be developed not only for the treatment of acute medical emergencies but also for proactive preventive management as well. These policies should be based on the principles of food allergen avoidance, including avoiding food sharing and cross-contact, and preparedness with epinephrine. Recommendations should be based on the scientific literature, including evidence that anaphylaxis results almost exclusively from ingestion of a food and not from inhalation or skin contact and that routine hand washing and cleaning are highly effective in the removal of food allergens. It is the role of the allergist to work with families and schools to provide them with the evidence base to formulate reasonable and practical IHPs that provide for safety without stigma (Table III). Schools should also be prepared to treat anaphylaxis in individuals who have had no previous history of allergy or anaphylaxis, and management plans for anaphylaxis from other triggers (eg, insect venom, medications, exercise, and latex) should be in place. With both school-wide policies and IHPs in place, the student with food allergy and children at risk for anaphylaxis should have an optimal opportunity to attain the full benefits of a safe and healthy learning environment.

What do we know?

- The prevalence of children with food allergy is rising, increasing the risk of food-induced anaphylaxis in schools.
- Food-induced anaphylaxis almost exclusively results from ingestion and oral/mucosal contact with food allergen and not from exposure to skin or inhalation.
- A primary risk of fatal food anaphylaxis is a failure or delay in the administration of epinephrine.
- Conventional cleaning techniques are effective in removal of allergen.

What is still unknown?

- Has the institution of school management guidelines reduced the incidence of allergic reactions and anaphylaxis from food exposures in the school setting?
- Do peanut-free schools have better outcomes than schools that allow peanuts?
- How does the institution of school management guidelines change the quality of life for the student with food allergy and the student without food allergy?
- Does the institution of school management guidelines change behavior and attitudes in the community at large? If so, do these changes in behavior affect the incidence of food-induced allergic reactions and anaphylaxis in the community?

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APPENDIX I

School guidelines for managing students with food allergies^{E2}:



SCHOOL GUIDELINES FOR MANAGING STUDENTS WITH FOOD ALLERGIES

Food allergies can be life threatening. The risk of accidental exposure to foods can be reduced in the school setting if schools work with students, parents, and physicians to minimize risks and provide a safe educational environment for food-allergic students.

Family's Responsibility

- Notify the school of the child's allergies.
- Work with the school team to develop a plan that accommodates the child's needs throughout the school including in the classroom, in the cafeteria, in after-care programs, during school-sponsored activities, and on the school bus, as well as a Food Allergy Action Plan.
- Provide written medical documentation, instructions, and medications as directed by a physician, using the Food Allergy Action Plan as a guide. Include a photo of the child on written form.
- Provide properly labeled medications and replace medications after use or upon expiration.
- Educate the child in the self-management of their food allergy including:
 - ☐ safe and unsafe foods
 - ☐ strategies for avoiding exposure to unsafe foods
 - ☐ symptoms of allergic reactions
 - ☐ how and when to tell an adult they may be having an allergy-related problem
 - ☐ how to read food labels (age appropriate)
- Review policies/procedures with the school staff, the child's physician, and the child (if age appropriate) after a reaction has occurred.
- Provide emergency contact information.

School's Responsibility

- Be knowledgeable about and follow applicable federal laws including ADA, IDEA, Section 504, and FERPA and any state laws or district policies that apply.
- Review the health records submitted by parents and physicians.
- Include food-allergic students in school activities. Students should not be excluded from school activities solely based on their food allergy.
- Identify a core team of, but not limited to, school nurse, teacher, principal, school food service and nutrition manager/director, and counselor (if available) to work with parents and the student (age appropriate) to establish a prevention plan. Changes to the prevention plan to promote food allergy management should be made with core team participation.
- Assure that all staff who interact with the student on a regular basis understands food allergy, can recognize symptoms, knows what to do in an emergency, and works with other school staff to eliminate the use of food allergens in the allergic student's meals, educational tools, arts and crafts projects, or incentives.
- Practice the Food Allergy Action Plans before an allergic reaction occurs to assure the efficiency/effectiveness of the plans.
- Coordinate with the school nurse to be sure medications are appropriately stored, and be sure that an emergency kit is available that contains a physician's standing order for epinephrine. In states where regulations permit, medications are kept in an easily accessible secure location central to designated school personnel, not in locked cupboards or drawers. Students should be allowed to carry their own epinephrine, if age appropriate after approval from the student's physician/clinic, parent and school nurse, and allowed by state or local regulations.

- Designate school personnel who are properly trained to administer medications in accordance with the State Nursing and Good Samaritan Laws governing the administration of emergency medications.
- Be prepared to handle a reaction and ensure that there is a staff member available who is properly trained to administer medications during the school day regardless of time or location.
- Review policies/prevention plan with the core team members, parents/guardians, student (age appropriate), and physician after a reaction has occurred.
- Work with the district transportation administrator to assure that school bus driver training includes symptom awareness and what to do if a reaction occurs.
- Recommend that all buses have communication devices in case of an emergency.
- Enforce a "no eating" policy on school buses with exceptions made only to accommodate special needs under federal or similar laws, or school district policy. Discuss appropriate management of food allergy with family.
- Discuss field trips with the family of the food-allergic child to decide appropriate strategies for managing the food allergy.
- Follow federal/state/district laws and regulations regarding sharing medical information about the student.
- Take threats or harassment against an allergic child seriously.

Student's Responsibility

- Should not trade food with others.
- Should not eat anything with unknown ingredients or known to contain any allergen.
- Should be proactive in the care and management of their food allergies and reactions based on their developmental level.
- Should notify an adult immediately if they eat something they believe may contain the food to which they are allergic.

More detailed suggestions for implementing these objectives and creating a specific plan for each individual student in order to address his or her particular needs are available in The Food Allergy & Anaphylaxis Network's (FAAN) *School Food Allergy Program*. The *School Food Allergy Program* has been endorsed and/or supported by the Anaphylaxis Committee of the American Academy of Allergy Asthma and Immunology, the National Association of School Nurses, and the Executive Committee of the Section on Allergy and Immunology of the American Academy of Pediatrics. FAAN can be reached at: 800/929-4040.

The following organizations participated in the development of this document:

American School Food Service Association
National Association of Elementary School Principals
National Association of School Nurses
National School Boards Association
The Food Allergy & Anaphylaxis Network

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APPENDIX II**FAAN Food Allergy Emergency Plan^{E3}:****Food Allergy Action Plan****Student's Name:** _____**D.O.B:** _____**Teacher:** _____Place
Child's
Picture
Here**ALLERGY TO:** _____Asthmatic Yes* ☐ No ☐ *Higher risk for severe reaction**◆ STEP 1: TREATMENT ◆**

Symptoms:		Give Checked Medication**: **(To be determined by physician authorizing treatment)	
▪ If a food allergen has been ingested, but <i>no symptoms</i> :		<input type="checkbox"/> Epinephrine	<input type="checkbox"/> Antihistamine
▪ Mouth	Itching, tingling, or swelling of lips, tongue, mouth	<input type="checkbox"/> Epinephrine	<input type="checkbox"/> Antihistamine
▪ Skin	Hives, itchy rash, swelling of the face or extremities	<input type="checkbox"/> Epinephrine	<input type="checkbox"/> Antihistamine
▪ Gut	Nausea, abdominal cramps, vomiting, diarrhea	<input type="checkbox"/> Epinephrine	<input type="checkbox"/> Antihistamine
▪ Throat†	Tightening of throat, hoarseness, hacking cough	<input type="checkbox"/> Epinephrine	<input type="checkbox"/> Antihistamine
▪ Lung†	Shortness of breath, repetitive coughing, wheezing	<input type="checkbox"/> Epinephrine	<input type="checkbox"/> Antihistamine
▪ Heart†	Weak or thready pulse, low blood pressure, fainting, pale, blueness	<input type="checkbox"/> Epinephrine	<input type="checkbox"/> Antihistamine
▪ Other†	_____	<input type="checkbox"/> Epinephrine	<input type="checkbox"/> Antihistamine
▪ If reaction is progressing (several of the above areas affected), give:		<input type="checkbox"/> Epinephrine	<input type="checkbox"/> Antihistamine

†Potentially life-threatening. The severity of symptoms can quickly change.

DOSAGE**Epinephrine:** inject intramuscularly (circle one) EpiPen® EpiPen® Jr. Twinject®0.3mg Twinject®0.15mg
(see reverse side for instructions)**Antihistamine:** give _____
medication/dose/route**Other:** give _____
medication/dose/route**IMPORTANT: Asthma inhalers and/or antihistamines cannot be depended on to replace epinephrine in anaphylaxis.****◆ STEP 2: EMERGENCY CALLS ◆**

1. Call 911 (or Rescue Squad: _____). State that an allergic reaction has been treated, and additional epinephrine may be needed.

2. Dr. _____ Phone Number: _____

3. Parent _____ Phone Number(s) _____

4. Emergency contacts:
Name/Relationship Phone Number(s)

a. _____ 1.) _____ 2.) _____

b. _____ 1.) _____ 2.) _____

EVEN IF PARENT/GUARDIAN CANNOT BE REACHED, DO NOT HESITATE TO MEDICATE OR TAKE CHILD TO MEDICAL FACILITY!

Parent/Guardian's Signature _____ Date _____

Doctor's Signature _____ Date _____
(Required)

TRAINED STAFF MEMBERS

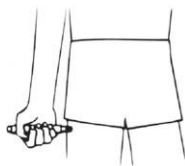
1. _____ Room _____
2. _____ Room _____
3. _____ Room _____

EpiPen® and EpiPen® Jr. Directions

- Pull off gray activation cap.



- Hold black tip near outer thigh (always apply to thigh).



- Swing and jab firmly into outer thigh until Auto-Injector mechanism functions. Hold in place and count to 10. Remove the EpiPen® unit and massage the injection area for 10 seconds.

Twinject® 0.3 mg and Twinject® 0.15 mg Directions



- Remove caps labeled "1" and "2."
- Place rounded tip against outer thigh, press down hard until needle penetrates. Hold for 10 seconds, then remove.



SECOND DOSE ADMINISTRATION:

If symptoms don't improve after 10 minutes, administer second dose:

- Unscrew rounded tip. Pull syringe from barrel by holding blue collar at needle base.
- Slide yellow collar off plunger.
- Put needle into thigh through skin, push plunger down all the way, and remove.



Once EpiPen® or Twinject® is used, call the Rescue Squad. Take the used unit with you to the Emergency Room. Plan to stay for observation at the Emergency Room for at least 4 hours.

For children with multiple food allergies, consider providing separate Action Plans for different foods.

***Medication checklist adapted from the Authorization of Emergency Treatment form developed by the Mount Sinai School of Medicine.*



TABLE E1. State guidelines for school management of food allergies currently in place^{E1}

State	Web address
Arizona	http://www.azdhs.gov/phs/oeh/fses/pdf/allergies1007.pdf
Connecticut	http://www.sde.ct.gov/sde/lib/sde/PDF/deps/student/health/Food_Allergies.pdf
Maryland	http://www.marylandpublicschools.org/NR/rdonlyres/6561B955-9B4A-4924-90AE-F95662804D90/8465/AnaphylaxisorSevereAllergicReactions.pdf
Massachusetts	http://www.doe.mass.edu/cnp/allergy.pdf
Mississippi	http://www.healthyschoolsms.org/health_services/documents/GuidelinesforManagingFoodAllergies.pdf
New Jersey	http://www.nj.gov/education/students/safety/health/allergies.pdf
New York	http://www.schoolhealthservices.org/uploads/Anaphylaxis%20Final%206-25-08.pdf
Tennessee	http://health.state.tn.us/Downloads/HealthySchoolsGuidelines.pdf
Vermont	http://education.vermont.gov/new/pdfdoc/pgm_health_services/food_allergies_manual_0608.pdf
Washington	http://www.k12.wa.us/HealthServices/pubdocs/GuidelinesCareStudentsAllergies.pdf
West Virginia	http://www.foodallergy.org/advocacy/advocacy-schools.html

For the most current information on state guidelines, go to the FAAN Advocacy site at <http://www.foodallergy.org/advocacy/advocacy-schools.html>.

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